

REMARKS

(I) REAL PARTY IN INTEREST

The real party in interest is Fairchild Korea Semiconductor Limited, the assignee of rights in the present application via an assignment recorded in the Patent Office at Reel 011324, Frame 0018.

(II) STATUS OF CLAIMS

Claims 1-6 and 8-11 are at issue. Claims 1-2, 4, 10, and 11 were rejected as unpatentable over Mehr (U.S. Pat. No. 5,530,295) in view of Ohno et al. (U.S. Pat. No. 5,227,662). Claims 3 and 5 were rejected as unpatentable over these references further in view of Majumdar et al. (U.S. Pat. 5,703,399). Claim 6 was rejected as unpatentable over Mehr and Ohno et al. further in view of McCarthy et al. (U.S. Pat. 3,956,726). Claim 8 was rejected as unpatentable over Mehr and Ohno et al. further in view of Tomita et al. (U.S. Pat. No. 5,440,169). Claim 9 was rejected as unpatentable over Mehr, Ohno et al. and Tomita et al. further in view of Majumdar et al. The applicants respectfully traverse the rejections.

(III) STATUS OF AMENDMENTS

No additional amendment have been made in this response, nor are any believed to be necessary.

(IV) SUMMARY OF INVENTION

Each of claims 1-6 and 8-11 recites a semiconductor power module that includes a heat sink having an electrical insulating property and thermal conductivity, and a sealer having an electrically insulating property and thermal conductivity.

(V) ISSUES

Whether a *prima facie* case of obviousness of claims 1-6 And 8-11 has been made when:

- A. Mehr and Ohno et al. fail to teach or suggest all the limitations of claim 1;
 - B. Ohno et al. teach away from the claimed invention and teach away from Mehr;
- and

C. one of ordinary skill in the art would not be motivated to combine Mehr and Ohno et al.

(VI) ARGUMENT

(A) The References Do Not Teach or Suggest all the Limitations of Claim 1

The applicants submit that claim 1 is not obvious over Mehr in view of Ohno et al. The action does not make out a *prima facie* case of obviousness. For example, neither Mehr nor Ohno et al. teaches or suggests all of the limitations of independent claim 1. In particular, claim 1 recites that the sealer is thermally conductive. Although Mehr discloses a dielectric housing (16), there is nothing to indicate that the housing (16) of Mehr is thermally conductive. In fact, Mehr improves thermal dissipation with only a heat sink (22) (col. 2, ll. 38-48), and does not disclose using a different material for the housing. As noted by Mehr, the housing material (i.e., glass-filled epoxy or silica-filled epoxy) creates significant thermal impedance rather than thermal conductance. (See Mehr, col. 1, ll. 17-20) As such, contrary to the assertion of the action, Mehr does not teach or suggest a thermally conductive sealer as recited by claim 1.

Likewise, although Ohno et al. disclose a resin sealant (38) through which some heat may be dissipated, Ohno et al. also disclose that the resin (38) is not an excellent heat conductor (col. 5, ll. 40-44), which indicates that the resin (38) is generally not thermally conductive. Therefore, Ohno et al. does not disclose or suggest a thermally conductive sealer as recited by claim 1.

The rejections of claim 1 and claims 2-6 and 8-11 dependent thereon are therefore improper for failing to cite references that teach or suggest all of the claim limitations of independent claim 1, whether taken individually or in combination. It is clear that a *prima facie* case of obviousness cannot be established where all the limitations of a claimed combination are not taught or suggested by the prior art. See *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). See also MPEP 2143.03.

(B) Neither the References nor the Action Provides a Sufficient Motivation or Suggestion to Combine the References

The applicants further submit that the action does not establish a *prima facie* case of obviousness because the action does not point to disclosure that would suggest or motivate

one of ordinary skill in the art to combine the references. In particular, one of ordinary skill in the art would not be motivated to combine Ohno et al. and Mehr based on heat conductivity as mentioned by Ohno et al. Mehr discloses that the heat sink (22) is already made of a thermally conductive material such as nickel plated copper or anodized aluminum. (Mehr, col. 2, ll. 43-48) There is simply no reason for one of ordinary skill in the art to look beyond Mehr for a heat sink having excellent heat conductivity because Mehr already claims to disclose a heat sink having improved heat conductivity. As such, one of ordinary skill in the art would not be motivated to combine the heat sink of Mehr with another heat sink based on excellent heat conductivity.

Further, the low manufacturing cost mentioned by Ohno et al. is an insufficient motivation to use aluminum nitride (AlN) for a heat sink. Ohno et al. disclose that only the particular embodiment shown in Figs. 3A-3D and 4 has the advantage of low manufacturing costs (col. 4, ll. 28-31). However, low cost is not attributed to a heat sink (40) made of AlN. (See Figs. 6 and 7) Figs. 3A-3D and 4, and the discussion thereof, disclose that a portion (32) of the lead frame (10) functions as the heat sink (col. 4, ll. 28-53). This embodiment has the advantage of low manufacturing cost because it does not include a heat sink (40), much less a heat sink made of AlN. One of ordinary skill in the art would thereby omit a heat sink if motivated by the low cost of Ohno et al., but would not be motivated to use a heat sink based on low cost. As such, neither Mehr nor Ohno et al. provide any suggestion or motivation to combine their respective disclosures.

The rejections of claim 1 and claims 2-6 and 8-11 dependent thereon are therefore improper for failing to provide a motivation or suggestion for the combination. *A prima facie* case of obviousness cannot be established without a suggestion or motivation to combine. See MPEP 2143.01

(C) The Cited References Teach Away From the Combination

It is further submitted that the action does not establish a *prima facie* case of obviousness because Ohno et al. teaches away from the combination. In particular, Ohno et al. teach away from claim 1 by stating that an insulating adhesive tape (16) bonds a pad (i.e., heat sink) to the lead frame (10). The bonding means (16) provides electrical insulation between the pad (i.e., heat sink) and the lead frame (10). (See Ohno et al., col. 2, ll. 51-65; Figs. 4, 6 and 7) Ohno et al. therefore suggests that the heat sink (14, 32, 40) alone is not

effective for electrical insulation and should not be in direct contact with the lead frame (10), despite the fact that AlN may be selected as the material for the heat sink (40). One of ordinary skill in the art would therefore not be motivated by Ohno et al. to provide a heat sink directly contacting a lead frame where the heat sink has an electrically insulating property as recited by claim 1, because Ohno et al. teaches away from a combination that includes a heat sink directly contacting a lead frame, as recited in claim 1.

Further, Ohno et al. teaches away from the device of Mehr. Mehr discloses a heat sink (22) pressed against a lead frame (18). The heat sink (22) is made of a thermally conductive material such as nickel plated copper or anodized aluminum. (Mehr, col. 2, ll. 37-47) The action notes the deficiencies of Mehr for failing to disclose a heat sink having an electrically insulating property. (See Action, p. 2) As discussed above, Ohno et al. disclose a heat sink (14, 32, 40) that is separated from the lead frame (10) by an electrically insulating bonding means (16) to provide electrical insulation between the heat sink (14, 32, 40) and the lead frame (10). (Ohno et al., col. 2, ll. 51-65; Figs. 4, 6 and 7) Ohno et al. thereby teach away from a heat sink that contacts a lead frame, as disclosed by Mehr. One of ordinary skill in the art would therefore not be motivated to combine the electronic package (10) of Mehr with the heat sink (40) of Ohno et al.

The rejections of claim 1 and claims 2-6 and 8-11 dependent thereon are therefore improper because the references teach away from claim 1 and from each other, and cannot be combined. A *prima facie* case of obviousness cannot be established where the references teach away from their combination. See MPEP 2145(X)(D)(2).

(VII) CONCLUSION

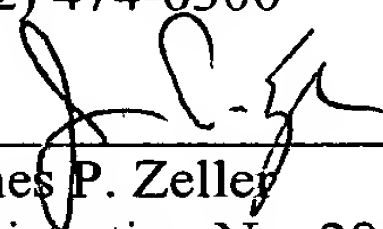
Accordingly, the applicants respectfully submit that all pending claims are patentable over the art of record and should be allowed. In the light of the foregoing, prompt issuance of a notice of allowance is respectfully solicited.

Should the examiner have any questions, she is respectfully invited to telephone the undersigned.

Respectfully submitted,

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